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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

PATEL, SHEFALI D

ART UNIT	PAPER NUMBER
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2621

DATE MAILED: 01/05/2004

12

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/538,398

Applicant(s)

SAWA ET AL.

Examiner

Shefali D Patel

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,4,6-8,10,11,13-15,17,18,20,21,25 and 29-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,4,8,10,11,15,17,18,21,25 and 29-31 is/are rejected.
- 7) ☒ Claim(s) 6,7,13,14 and 20 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. This action is in response to the amendment filed on October 6, 2003.
2. The drawings of figures 5 and 12 have been received.
3. Claims 2, 5, 9, 12, 16, 19, 22-24 and 26-28 have been cancelled.

Response to Arguments

1. Applicant's arguments with respect to claims 1-4, 8-11, 15-18 and 21-31 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3-4, 8, 10-11 and 21, 25, and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bunn (USPN 4,641,350) in combination with Schott (USPN 5,850,466), and further in view of Iwase (USPN 5,226,093).

With regards to **claim 1** Bunn discloses a pattern inspection method and a device which compares a real pattern window having real pattern data corresponding to predetermined pixels of the real pattern data obtained by imaging an inspection object to a design pattern window corresponding to the real pattern window and shifted design pattern windows which are obtained by shifting the design pattern windows in a plurality of directions. Bunn discloses a data of a reference image (X x Y) at column 6 lines 3-5 while the shift design pattern window (M x N) is

Art Unit: 2621

at column 6 lines 27-29, comparing (column 6 lines 34-44) these two arrays (i.e., windows) (column 8 lines 40-42). Bunn discloses selecting one window from the design pattern window and shifted pattern windows at column 7 lines 26-31. Bunn also discloses performing a pattern inspection of the inspection object, (corresponding to the center pixel, according to a result of the comparison) at column 7 lines 35-45. Note that the "M x N sub array is selected to be larger than the X x Y sub array in both dimensions to permit a search for a best match at many possible locations" (see Bunn: column 6, line 40-43). Thus the arrays are shifted relative to one another as required in the claims. Bunn does not expressly disclose the shift width of the shifted design pattern windows being within one pixel. Schott discloses shifting the designed pattern window within one pixel at column 5 lines 46-55. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have the shift width of the design pattern windows within one pixel to improve an inspection precision by eliminating errors as suggested by Schott at column 5 lines 51-52. Bunn discloses sub-array (60, 62, 64, and 66) of shift design pattern window (M x N) and sub-array (52, 54, 56, and 58) of a reference image (X x Y) where the correlation sub-arrays are arranged so that the correlation values produced when the reference sub-arrays are in this original or zero registration error position lie in the geometric center of the correlation sub-array as seen in Figs. 4a-4d and at col. 7 lines 51-61 and col. 8 lines 28-34. Note: the sub-array of a reference images are always in the center of the sub-array of the design pattern window when being correlated as seen in Figs. 4a-4d. However, neither Bunn nor Schott expressly discloses comparing a center pixel of the real pattern window to a center pixel of the selected design pattern window. Iwase discloses comparing a center pixel of the real pattern window (i.e., C) to a center pixel of the selected design pattern window (i.e., C') at col. 1

Art Unit: 2621

lines 22-28. Iwase discloses comparing center of the real (i.e., design pattern window) frame with the center of another block (preceding frame, i.e., reference frame) in his "description of the prior art" and hence, comparing the center pixel of the two frames (i.e., window, block) is conventional in the art and at the time the invention was made, it would have been obvious to a person of ordinary skill in the art to compare the center pixel in order to inspect or detect the motion vector (i.e., inspecting a pattern) as suggested by Iwase at col. 1 lines 28-53. Therefore, it would have been obvious to combine Iwase and Schott with Bunn to obtain the invention as specified in claim 1.

With regards to **claim 3** Bunn discloses a method and a device where the plurality of directions are eight directions of 0°, 45° (Figure 4b), 90°, 135° (Figure 4a), 180°, 225° (Figure 4c), 270°, 315° (Figure 4d) with respect to the center pixel of said real pattern window at column 7 lines 61-66. (Note that the windows 60, 62, 64, and 66 is being shifted respect to the dotted square which is the original (i.e., real) X x Y window). Keep in mind that Bunn discloses all the eight direction. By shifting the windows 52, 54, 56 and 58 (as shown in Figs. 4a-4d) 0°, 90°, 180°, and 270° are covered.

With regards to **claim 4** Bunn discloses a performing step comprising obtaining a difference value between the center pixel of the selected design pattern window and a center pixel of the real pattern window (column 7 lines 55-61, note that by comparing two images and finding the difference between the two (error), Bunn finds the difference value) and determining a defect of the inspection object by comparing the obtained difference value and a threshold value set in advance (column 8 lines 28-34). Please note that Iwase discloses comparing the center pixel in two different windows as disclosed above in claim 1.

Claim 8 recites identical features as claim 1 except claim 8 is a device claim. Thus, arguments similar to that presented above for claim 1 is equally applicable to claim 8.

Claim 10 recites identical features as claim 3 except claim 10 is a device claim. Thus, arguments similar to that presented above for claim 3 is equally applicable to claim 10.

Claim 11 recites identical features as claim 4 except claim 11 is a device claim. Thus, arguments similar to that presented above for claim 4 is equally applicable to claim 11.

With regard to **claims 21, 25, 29-30**, Bunn (as modified by Schott and Iwase) discloses all of the claimed subject matter as already discussed above in paragraph 3 and the arguments are not repeated herein, but are incorporated by reference. Claims 21, 25, and 29-30 distinguishes from claims 1 and 8 only in that it discloses inspection pattern and non-defective pattern.

Bunn discloses a pattern inspection apparatus comprising: an image device to which an image of an inspection object is input and from which an inspection pattern data of the input image is output, which is digitized for each of pixels at column 4 lines 27-29; a memory storing the *inspection pattern* data output from the image device at column 4 lines 51-54; means for extracting an inspection pattern (i.e., referred as “real pattern” in claim 1) data window with a noticed pixel located at a center (column 7 line 51-55, note: the center of the sub-array is used as the noticed pixel for correlation), from the inspection pattern data sorted to inspect a part of the inspection object at ((X x Y), column 6 lines 3-5); means for extracting a *non-defective* (i.e., referred as “shift design pattern windows” in claim 1 and “design pattern” in claim 25) pattern data window with the noticed pixel located at the center, from a non-defective pattern data ((M x N), at column 6 lines 27-29); means for comparing the extracted inspection pattern data window

Art Unit: 2621

with the generated non-defective pattern data window, thereby inspecting the part of the inspection object at column 6 lines 34-44. Bunn does not expressly disclose a non-defective pattern data window located at a position that is shifted from the noticed pixel by a width smaller than one pixel. Schott discloses a non-defective pattern data window located at a position that is shifted from the noticed pixel by a width smaller than one pixel at column 5 lines 46-55. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have the shift width of the design pattern windows within one pixel to improve an inspection precision by eliminating errors as suggested by Schott at column 5 lines 51-52. Please note that Iwase teaches means for comparing center pixel of the design and reference window as disclosed above in claim 1.

4. Claims 15, 17-18 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bunn in combination with Schott and Iwase as discussed in claims 1, 3-4, 8, 10-11 and 21, 25, and 29-30, and further in view of Scepanovic et al. (USPN 6,175,953).

With regards to **claim 15** Scepanovic et al. discloses a substrate with a light shielding film on which a mask pattern is formed and inspecting a substrate with the light shielding film on which a mask pattern is formed at column 2 lines 18-31. Scepanovic et al. further teaches at column 10 lines 66-67 and column 11 lines 1-9 of relating his invention to machine-readable media and manufacturing. Thus disclosing the method of manufacturing a mask. Scepanovic et al. does not expressly disclose the inspecting steps in claim 15. The recited features of the inspecting step (claim 15 pages 6-7) are the same as those in claim 1 as to the relevance of Bunn, Schott, and Iwase are incorporated herein. At the time the invention was made, it would have

Art Unit: 2621

been obvious to a person of ordinary skill in the art to apply the image processing method (i.e., inspection) of Bunn in Scepanovic et al.'s invention for immunity of distortion and misregistration of images.

With regards to **claims 17-18**, the recited features are the same as those in claims 3-4, and the arguments in paragraph 3 above as to the relevance of Bunn, Schott, and Iwase are incorporated herein.

Claim 31 recites identical features as claim 15 except claim 31 is a device claim. Thus, arguments similar to that presented above for claim 15 is equally applicable to claim 31.

Allowable Subject Matter

5. Claims 6-7, 13-14 and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The closest prior art to Bunn, Schott, Iwase and Scepanovic are directed to a pattern inspection method comprising comparing a real pattern window and a shifted design pattern window; selecting one window from the design pattern window and shifted design pattern window; comparing a center pixel of the real pattern window to a center pixel of the selected design pattern window; and performing a pattern inspection of the inspection object as disclosed in claims 1, 8, 15, 21, 25, and 29-31. However, the closest prior art fails to disclose anything about the performing step comprising obtaining a difference value by subtracting a noticed pixel of the selected one window and predetermined pixels surrounding the noticed pixel of the selected one window from a noticed pixel of the real pattern window and predetermined pixels

Art Unit: 2621

surrounding the noticed pixel of the real pattern window, outputting 1) a "0" difference value in a case where the obtained difference value is within a difference value obtained by shifting the design pattern window by one pixel or less, 2) a difference value obtained by subtracting the minimum value from obtained difference value and 3) a difference value obtained by subtracting a maximum value of difference values which are obtained by shifting the design pattern window by one pixel or less from the obtained difference value in a case where the obtained difference value is larger than the maximum value, and performing the pattern inspection of the inspection object by comparing the outputted difference value with a threshold value set in advance; as disclosed in claims 6, 13 and 20. It is for these reasons in combination with all the other elements of the claim that claims 6, 13, and 20 would be allowable if rewritten in independent form including all of the limitation of the base claim and any intervening claims. Claims 7 and 14 are allowable for the same reason as claims 6, 13, and 20.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

Art Unit: 2621

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shefali D Patel whose telephone number is 703-306-4182. The examiner can normally be reached on M-F 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H Boudreau can be reached on 703-305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-0377.


DANIEL MARIAM
PRIMARY EXAMINER

Shefali D Patel
Examiner
Art Unit 2621

December 16, 2003